



Growing Hydroponic Cucumbers in a Plastic Trash Container

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Cucumbers can be grown in a large plastic trash container (30–35 gallons) by a simple noncirculating hydroponic method that does not require electricity or a pump. The grower fills the trash can with water, adds the correct amount of fertilizer, places the lid on the container, and seeds or transplants a cucumber plant into a forestry tube inserted into and held by the lid. No additional water or fertilizer are needed. The crop is normally terminated when most of the nutrient solution is consumed.

This hydroponic technique is ideal for plant growth demonstration projects at the elementary, intermediate, and high school levels, because the materials are inexpensive and readily available and weekend watering is not necessary. Weed control can be achieved by placing black plastic weed-mat on the ground under the trash container. A permanent trellis system can be established because there is no need to dismantle the trellis system to cultivate the soil beneath the system. More information on cucumber cultivar selection and control of insects and diseases may be obtained from CTAHR's *Field Cucumber Production Guidelines for Hawaii*.

Materials needed

Plastic trash container (30–35 gallon), with lid.

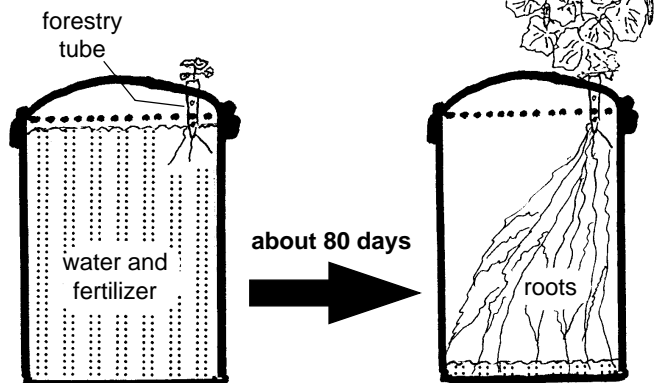
Hydroponic fertilizer.

Forestry tube (1½ inches diameter x 8 inches long).

Growing medium to fill the forestry tube (may contain at least two of the following: peat, perlite, vermiculite, coir).

Cucumber seeds.

Electric drill with ¼-inch bit and 1½-inch hole saw.



Instructions

Rinse the plastic trash container with water twice if it is already clean. Do not use bleach. If the container is dirty and dish soap is used to clean it, rinse several times to remove the soap. Place the container on a level surface in a location that receives plenty of light and is protected from wind. Good locations include a greenhouse, under the overhang of a house, or in a garden area. Outside areas are acceptable because cucumbers tolerate rain fairly well, and the sloping sides of the trash container lid prevent most of the rain from entering the container.

Add about 10 gallons of water to the container. Tap water is suitable in most Hawaii locations.

Add fertilizer (special hydroponic fertilizer formulations are preferred because they help to stabilize the nutrient solution pH and provide all of the essential macro- and micro-nutrients).

Fertilizer options

Choice 1: Add ½ lb of Chem-Gro® 10-8-22 hydroponic fertilizer or equivalent plus 2 oz of magnesium sulfate.

Choice 2: Add 3 oz of Chem-Gro 8-16-36 hydroponic fertilizer or equivalent, 3 oz of calcium nitrate (soluble grade), and 2 oz of magnesium sulfate.

Stir the contents to dissolve the fertilizer. Some of the fertilizer may settle to the bottom and remain undissolved; that's okay.



A vigorous cucumber plant growing in a plastic trash container. Pumps and electricity are not required. No additional water or fertilizer is needed beyond the initial set-up.

Then, fill the container with water to about 1 inch from the top. Stir the nutrient solution (water plus fertilizer) again.

If your tap water is known to have a high salts content (>0.2 mS), it would be best to substitute rainwater. Excessive salts in the water will concentrate as the nutrient solution is taken up, and plant growth will be adversely affected.

Forestry tubes typically have holes only at the bottom of the tube. Drill 6 or more $\frac{1}{4}$ -inch diameter holes in the sides of the forestry tube. This will allow the roots to emerge from both the bottom and the sides of the lower part of the forestry tube. Fill the forestry tube with growing medium. Tap the tube to help settle the growing medium, but do not pack it too tightly.

Drill a $1\frac{1}{2}$ -inch diameter hole with a hole saw in the trash container lid about 3 inches from the edge. Place the forestry tube containing the growing medium into the lid. If the hole is placed in the middle of the lid, the forestry tube might not be long enough to reach the nutrient solution. Also, the edge of the lid is stronger than the middle.

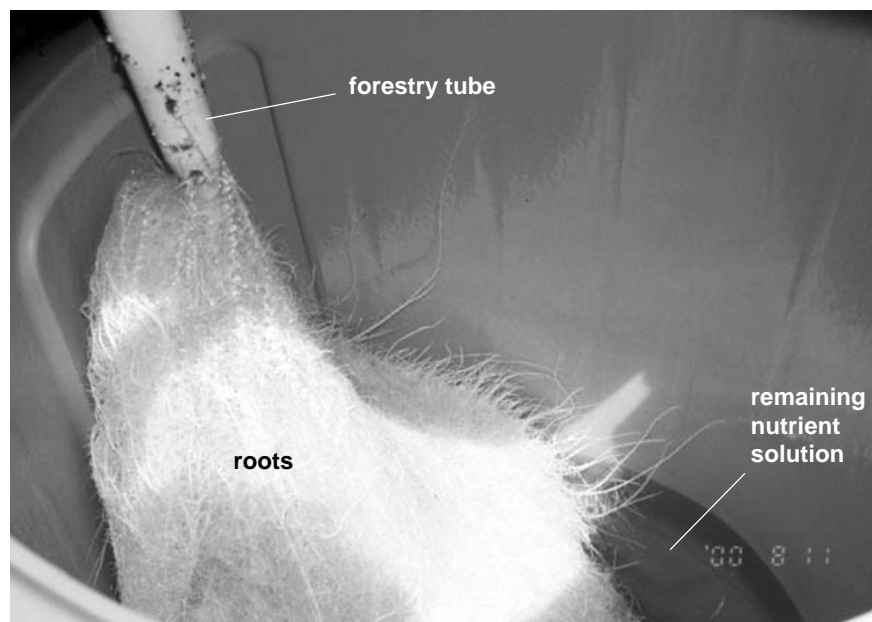
Only one forestry tube is needed for each trash container. The forestry tube should fit snugly in the trash

container lid. This will help to prevent mosquitoes from entering the trash container, which could then become a breeding ground for mosquitoes. The lower 1–3 inches of the forestry tube should be immersed in the nutrient solution. A small amount of growing medium may fall into the nutrient solution. That's normal.

The growing medium becomes moistened by capillary action. If the growing medium remains dry, slowly add 1–2 teaspoons of water to the growing medium in the forestry tube.

Make a $\frac{1}{2}$ -inch deep hole in the moist growing medium with the blunt end of a pen. Plant 1 cucumber seed and cover it lightly with growing medium. If the growing medium is still dry, slowly add another teaspoon of water. The seed should germinate in 2–5 days. If the seed does not germinate, it may be of poor quality. Heat and high humidity destroy seed viability, so keep seeds in the refrigerator from the time they are purchased. Alternatively, you may wish to germinate seedlings in forestry tubes on a seedling bench and transplant the tube with the best plant when the seedling is 1–2 weeks old.

After the roots have emerged from the forestry tube, do not pull the forestry tube from the lid—the roots will be damaged.



A view inside the plastic trash container showing profuse root growth. Most of the original nutrient solution has been consumed by the plant.

The nutrient solution level will recede as the plant grows. We usually do not add more water or fertilizer to the trash container, because raising the nutrient solution level in a noncirculating hydroponic tank typically damages the plant. Plants grow best when the nutrient solution level remains constant or lowers as the plant grows.

Build about a 6-foot high trellis to support the cucumber foliage. Train the cucumber vine so that it clings to the trellis.

Harvest the cucumbers when they are ready. First harvest is generally about 50 days from seeding. The crop will be terminated when most of the nutrient solution is consumed or when insect and/or disease pressure becomes excessive (usually after about 1 month of harvesting). Expect a yield of about 5 pounds per plant.

Upon termination of the crop, empty the remaining nutrient solution at the base of some bushes or trees. Remove the root mass from the trash container and wash the container. Remove the growing medium from the forestry tube and wash the tube.

Then you are ready to go back to the first step and start the next crop.

References

- Kratky, B.A., G.T. Maehira, and R.J. Cupples. 2000. Non-circulating hydroponic cucumber production in plastic trash containers and polyethylene-lined barrels. *Proceedings of National Agricultural Plastics Congress* 29:210–215.
- Valenzuela, H.R., R.T. Hamasaki, and S.K. Fukuda. 1994. Field cucumber production guidelines for Hawaii. UH CTAHR Research Extension Series 151.

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